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ABSTRACT

The Purdue School of Engineering and Technology (Indianapolis, Indiana) sponsored a career exploration program for physically handicapped high school students. Each group of students spent three mornings in one of four engineering and technology areas. In the computer section, half the time was spent in the classroom discussing such topics as what computers do, what they look like, the three basic steps in computing, the program development cycle, and the BASIC programing language. The rest of the time was spent in a computer laboratory working on assignments using terminals. Assignments included playing games, learning the BASIC language through computer assisted instruction, entering a program, running a program, and modifying a program. All students were successful in playing computer games and completing the BASIC computer assisted instruction. Some students showed insight into understanding computer logic. On the terminals, students worked independently most of the time, concentrated on their assignments, and seemed to enjoy what they were doing. (Author)

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A CAREER FOR THE PHYSICALLY HANDICAPPED - COMPUTER PROGRAMMER

In the Summer of 1980, the Purdue School of Engineering and Technology at Indianapolis established a career exposure program for physically handicapped high school students which allowed them to explore four areas - Computer Technology, Electrical Engineering, Mechanical Engineering, and Biomedical Engineering. The focus of this article will be on the Computer Technology experience. The curriculum for the entire program was designed to allow three days of class time for each of the four program components. Students were in class for two hours each day. Within the four sections of students, class size varied from three to eight students and each section was led by one faculty member who had two assistants.

Selection Criteria

A letter was sent to high school counselors in the Indianapolis area announcing the career exploration program. It stressed that the students be classified as physically handicapped not mentally handicapped, not vision or sight impaired. The students should have an aptitude for science or have shown some interest in it. Informal conversations with counselors and parents were done and if a student showed any potential, was chosen for the program. There were twenty students the first year and twenty-five the second.

Activities

A typical day in the course on Computer Technology was split into one hour of class time - where lecture and discussion prevailed; and one hour of lab time in a laboratory setting containing hard copy terminals for each student. Each day they were given assignments to complete in the lab.

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On the first day during class time, the instructor gave an introduction to computers emphasizing the design, structure and functions of computers. Lab time on the first day consisted of a tour of the computer facility. Afterwards, students used the terminals to play computer games designed to familiarize them with using the computer. The games they chose ranged from football, basketball, hangman, star trek, war, to bingo. They all succeeded at playing at least two different games. One student with severe cerebral palsy and very little motor movement was very slow at responding; however, he was able to read and comprehend what was being asked of him. A student with one normal arm was able to react and play the game at the same speed a regular student would. Consequently, there was a great time disparity between the fastest and slowest students.

The second day of class was spent talking about programming focusing on the term "software". Different programming languages were described, and the steps involved in the program development cycle was covered in detail. The structure and beginning statements of the BASIC language were introduced. Then a simple problem of adding any two integers and multiplying them was used as example of how to develop a program. The class then participated in a simulated execution of this program.

Lab time on that day included computer assisted instruction in the BASIC language and entering a small program and running it. Their assignment was to run the first four lessons in BASIC. Like assignment of the computer games, this assignment gave alot of English information and instruction and required brief numeric answers. It covered things such as the variable = expression concept, input data, output results, and other introductory activities.

The last day of class time included the computer commands and their functions, the concept of loops, and modification of the earlier program to include a loop. Finally, the career development necessary to become a computer programmer was discussed. They were told that an individual needs a good knowledge of algebra, should be able to think logically, be able to break things into small steps, have developed good problem solving techniques, and be able to type. These involve at least a high school education and now-days a post secondary associate degree. They were told that programming is basically a sit down job which makes it suitable for the physically handicapped.

The last day of lab time was spent completing the assignment of entering and running a program, and then modifying and rerunning the program. Over half the students modified and reran the program. Some of them ran more tutor lessons.

Problems

On the hardcopy terminals, wheelchairs would sometimes jam the paper. One solution to this was to only have a small amount of paper instead of a box of paper. Another solution would be to use CRT terminals.

Some of the wheelchairs sat too low in front of the terminals and the student couldn't see current printed line. The solution to this was to raise the cover on the terminal or again would be to use CRT terminals.

Transporting students from one area to another requires extra time and should be taken into account when working with the physically handicapped.

There was a big difference in the amount of time it took students to do assignments. This was partially due to poor finger psycho motor movement and partially due to mental ability.

Successes

On the whole the students worked independently much like a regular class would do. They were successful in completing many assignments which gave them a real sense of accomplishment. One of the students who participated in this program and another hospital program had a complete personality change. She changed from a very shy, introvert, uncommunicative girl into a perky, happy, verbal one. Two other students purchased micro-computers after participating in the program which they used to further their interests and skills in the area of computing.

Seventy-five percent of the students comprehended what they were doing, and what was discussed in class. Twenty-five percent of the students showed some real insight into programming, logical techniques, and were ready to develop their own small programs.

The computer assisted instruction was as enjoyable to the students as the computer game. This was a surprise to me.

They worked very dilligently on their assignments, and showed alot of enthusiam

and interest in what they were doing.

They learned quite a number of things such as interacting with a computer, responding with a code (number) rather than an English word, manipulating the computer to get it to do whay they wanted to do, and recognizing statements in a BASIC computer program.

Conclusions

Computer assisted instruction could be a very workable method to use with the physically handicapped. It could be used to teach them arithmetic, science, English language structure, spelling, etc.

A mind is a terrible thing to waste. This statement applies to the physically handicapped as well as the black minority.

Computer programmer is a career that the physically handicapped can pursue and be successful at it.

The computer can be used as a tool to enable the verablly impaired or physically hand impaired to communicate. By using a terminal, the student could enter stories into the computer, answer questions on a test or anything that requires words; this would give them an opportunity to develop written communication skills by using the computer as the means rather than the pencil and paper. This could open the door to new career possibilities which in the past have been prohibitive to them.